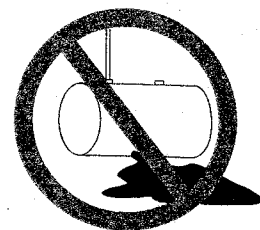


# L.U.S.T.LINE

A Report On Federal & State Programs To Control Leaking Underground Storage Tanks



## THE FUTURE IS COMING TO A WEB SITE NEAR YOU

by Ann Bonner Carpenter

**R**egulators, can you provide prompt answers to public information questions and at the same time be off doing a site inspection? Can you easily and quickly access site-specific data from all across the regulatory landscape from one source? Can you enter site data onto your database from the field? If you can't, why not? The technology is here, it's getting more user-friendly and affordable every day, and it can make your workload a whole heck-of-a-lot more manageable.

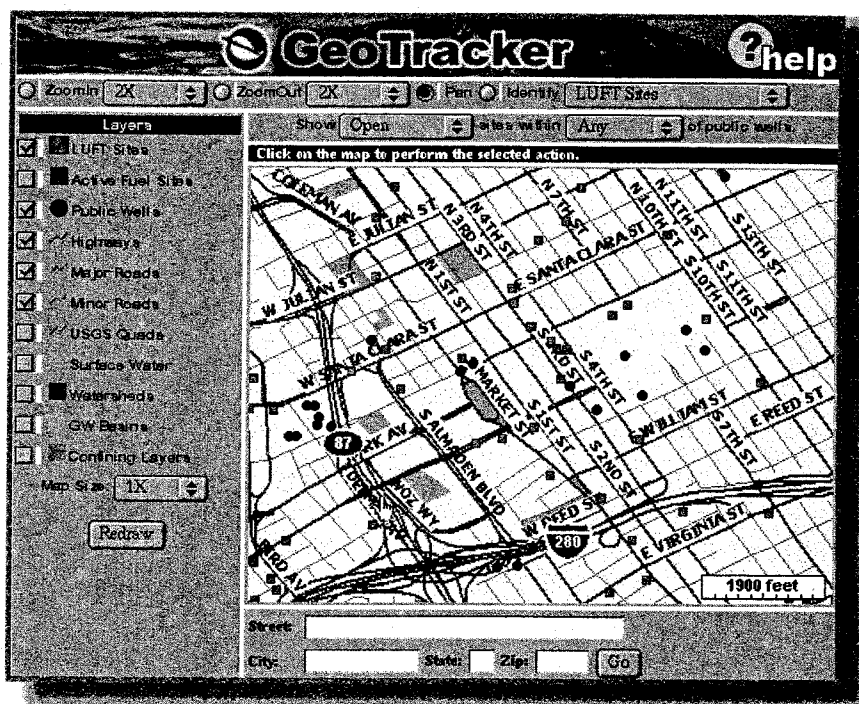
One-stop database shopping is already up and running in some states and gearing up in others. Geographic Information Systems (GISs) are being used by regulators in many states as an important tool in the day-to-day business of environmental management and decision making. Mapping software can help them analyze data, while the Internet allows them to speed it to those who need the information and who would otherwise be calling on the phone. Don't have good location data? Well, all is not lost—there are several ways to get it, including highly accurate Global Positioning Systems (GPSs).

For regulators, the marriage of GIS, GPS, and Internet access can be a dream come true. For users, it's as easy as shopping on-line—and you don't even need a credit card.

### Why Do It?

Ignorance is not bliss. GIS brings to light spatial relationships that may otherwise be unknown because information is scattered throughout various regulatory programs. Regulatory entities often lack the wherewithal to efficiently and effectively share information on gasoline releases and water supply contamination. This lack of communication can jeopardize water quality.

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## ■ The Future Is Coming...

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Easy access to environmental information is important for stakeholders, such as water suppliers, responsible parties, consultants, and the general public. When regulatory personnel and stakeholders can easily access the same data, the result should be less duplication of effort, better communication, and more informed decision making. And the environment is a winner, too.

When a release has been identified, UST regulators can use GIS mapping information to identify such decision-making criteria as proximity to wellhead protection areas, drinking water wells and aquifers, and other receptors. Water suppliers, land-use planners, and developers can use GIS to locate potential sources of contamination (e.g., UST facilities, dry cleaners, landfills) near drinking water sources. Realtors, developers, and bankers can use GIS to identify,

among other things, potential environmental risks.

California's GIS was developed in response to a legislative mandate. With the closure of several Santa Monica drinking water wells contaminated with MTBE in 1997, the state legislature passed two bills that charged the State Water Resources Control Board (SWRCB) with the task of assessing the feasibility and appropriateness of establishing a statewide environmental database and GIS mapping system, beginning by conducting pilot projects in the Santa Monica and Santa Clara Valley areas.

*GIS brings to light spatial relationships that may otherwise be unknown because information is scattered throughout various regulatory programs.*

In response, SWRCB and Lawrence Livermore National Laboratory (LLNL) staff members worked together to develop GeoTracker, a GIS that provides on-line access to environmental data. GeoTracker is the interface to the state data warehouse, the Geographic Environmental Information and Management System (GEIMS).

GeoTracker was developed to provide timely information to coordinate and support state agencies in protecting public drinking water sources from motor fuels contamination. The SWRCB has already realized those benefits and more from having the system up and running and on-line (<http://www.geotracker.ecointeractive.com/>). The entire state is now included, and the agency is planning to add active fuel sites and other data layers, such as recharge areas.

At the regional level, EPA Region 3 is working with its states to develop a pilot system to obtain location data and map wells and regulated facilities, with the goal of GIS analysis and Internet access. Like California, Region 3 will begin with two counties. The region is also considering developing a risk-indexing tool to aid in planning.

If your UST/LUST program hasn't already done so, there are several good reasons to start planning

for GIS mapping and linking up with the Internet:

## ■ Better Manage Site Cleanup Objectives

When you must respond quickly, there is no time for an archaeological dig in the file room. With GIS, you can view the area where an UST release has occurred and identify potential receptors. The more data available to you, the better informed your decision and the more timely your response.

GIS can help you prioritize sites based on risk. "To help us with our risk evaluation," explains Art Shrader, with the South Carolina UST program, "we put all our GPS data into a common database, shook it up twice, and asked the system to tell us which of our LUST facilities were within 1,000 feet of a public water supply. We used that information to prioritize sites that had the highest potential risk so that we could begin assessments on those sites first."

Beginning in 1997, the South Carolina UST program identified 300 sites that met the high-risk criterion. Since then, about every six months, when the analysis is run again, an additional 10 to 20 sites are added to the assessment priority list.

## ■ Streamline Permitting, Enforcement, and Reporting

The Internet can streamline the permit renewal and compliance process by making it easy to enter, transmit, and retrieve data. For example, on-line UST permit forms and reporting forms are available through GeoTracker. These well-designed forms help improve the accuracy of information collected. Pull-down lists, check boxes, and select boxes give the user specific choices so that data are standardized. Error-checking software further quality-controls the values of information when it is entered on the Internet forms to assure data quality. When entering an address, for example, the system will prompt the user if the ZIP code is not consistent with the city. Now, one person can conveniently enter information and transmit it for storage and use by others. After the permit is approved, the data moves into the GEIMS database. Handwriting and in-box delays are no longer an issue. Costs are reduced and accuracy is increased.



### LUSTLine

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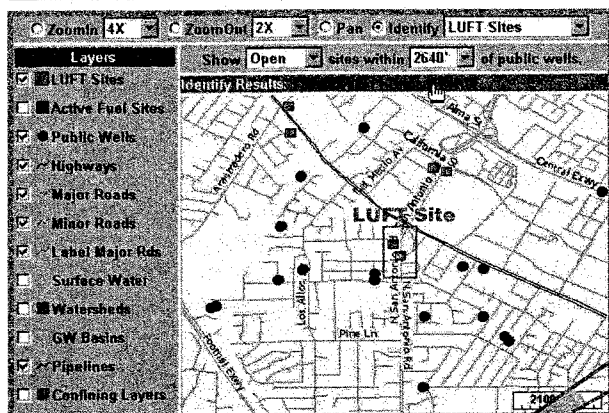
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After selecting a LUFT site, detailed reports of the site can be generated by selecting hotlinked windows.

**Leaking Underground Fuel Tank Report for:**  
Unocal #4918 ( Santa Clara County)  
895 N San Antonio Rd  
Los Altos, CA 94022

Other Ground Water

**Regulatory History:**

Date the case was first reported	1992-06-30
Date case entered into system	1992-12-14
Date case was last reviewed	1999-03-10

Regulatory history report for National Gasoline site.

Detailed information for National Gasoline site.

**Leaking Underground Fuel Tank Report for:**  
Unocal #4918 ( Santa Clara County)  
895 N San Antonio Rd  
Los Altos, CA 94022

Site Info: (regulatory history) (locational information) (detailed site info)

San Francisco Bay  
Santa Clara Valley Water District

Leak Info: (more detailed release information)

Automotive Gasoline  
Excavate and Dispose

7 Public Water Wells Estimated to be Within 1/2 Mile: (detailed well info)

**Leaking Underground Fuel Tank Report for:**  
Unocal #4918 ( Santa Clara County)  
895 N San Antonio Rd  
Los Altos, CA 94022

Public Water Wells Estimated to be Within 1/2 Mile:

Case	Case No	Case Name	Case Status	Case Depth
Cwsc Los Altos Suburban	4310001	06S02W-20L02 M	NLA MOSHER 02 - DESTROYED	2505 Feet
Cwsc Los Altos Suburban	4310001	06S02W-20M01 M	NLA ALVARADO - DESTROYED	1785 Feet
Cwsc Los Altos Suburban	4310001	06S02W-20F03 M	NLA CUTTER - DESTROYED	1867 Feet
Cwsc Los Altos Suburban	4310001	06S02W-19G02 M	NLA STEVENS - DESTROYED	2224 Feet
Cwsc Los Altos Suburban	4310001	06S02W-19H02 M	WELL 121-02	921 Feet
Cwsc Los Altos Suburban	4310001	06S02W-19H03 M	WELL 121-03	794 Feet
Cwsc Los Altos Suburban	4310001	06S02W-20F04 M	WELL 120-01	1392 Feet

Summary information for National Gasoline site.

Wells within 1/2-mile radius of National Gasoline site

Source: <http://www.geotracker.ecointeractive.com/>.

## Improve Data Accuracy

The accuracy and consistency of environmental data are particularly important in LUST site remediation, where the relationship of LUST sites and drinking water wells is always a number one question. Many states are working on the frustrating task of improving data accuracy.

California's GeoTracker features a repositioning tool in which an authorized user with a password can go in and correct a location or other site data of a regulated facility. The tool includes a short tutorial and features a list of facilities sorted by an estimated level of accuracy (in feet), beginning with the least accurate. The authorized user can change the LUST site information directly within the GEIMS database. The database automatically records the correction, the name of the person who made the change, and the method used (the tool). The estimated accuracy for this method is less than 200 feet.

When information is accessible, users will often let you know when they find an error. In Idaho, the pub-

lic has responded to errors—although it may take time for someone to notice. A landmark gas station in Boise was "misplaced" on the map for about a year before someone noticed that that it was at the wrong intersection. California has also recognized the value of the public in finding mistakes and reporting them to the responsible party.

## Provide Information to the Public and Other Agencies

The demand (and legal requirement) for public access to information is growing. Many states are developing data warehouses that open up access to information. Realtors, consultants, and homeowners increasingly need or want to know where storage tanks and other environmental threats are located. Sorting through mountains of paper is not practical.

Other agencies and programs have their own reasons for accessing GIS information. In Virginia, for example, the Department of Environmental Quality (DEQ) is required by law to supply the public with a

monthly update of new petroleum releases. In New York, the health department has requested information such as the locations of chemical and petroleum storage tanks for studies on cancer.

Idaho has created a system to respond to public information questions from realtors and environmental consultants. Matt Walo, a GIS analyst for the Idaho DEQ, has found that about 700 maps per month are accessed over the Internet, while the number of calls regarding this information has dropped to a few per month.

"Now we direct people to our Web site, and we don't ever hear from them again," says Walo. The Idaho Interactive Mapping "Quick Start" tutorial walks users through the process of how to query—how to locate and identify sites and how run proximity analyses. You can access the site at <http://www2.state.id.us/deq/>. Look for the GIS icon at the bottom of the page.

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Vermont's Agency for Natural Resources distributes public data via its GIS data warehouse, the Vermont Center for Geographic Information (VCGI). Users can select an area on a state map, zoom in or out, turn available data layers on or off, and click on a well or facility symbol to find its name, address, and more specific information. The site has links to important regulatory information and notices from the water supply and waste management divisions. There's a link for water supply operators and links to contact staff.

The Vermont UST program Web site provides a listing of upgraded USTs for purveyors of fuel (required for delivery of product), a report on the Petroleum Cleanup Fund, and a grant application package for removal of farm and residential USTs. The screens are appealing and easy to use. Visit the site at <http://www.anr.state.vt.us/gismaps/>.

Another site to visit that is oriented toward public use is Delaware's Environmental Navigator. Contaminated site information includes general site discovery information, a site history summary, contaminants, proposed or final plans, site status, and deed restrictions. This site is located at <http://sirb.awm.dnrec.state.de.us/>.

These Web sites give new meaning to the word "accessibility," and they suggest an openness and willingness to serve the constituency.

#### ■ Facilitate Land Use Planning, Source Water Protection, and More

With a wealth of environmental, land use, and historic information at your fingertips, there is no excuse for making uninformed land use decisions. GIS information can be a tool for evaluating risk to public health and safety and risk to ground and surface water resources. Accurate knowledge of existing and potential source locations can help determine appropriate setback distances for a multitude of competing uses, such as buildings, wells, water supplies, and parking lots.

#### ■ Visualize and Publicize

A picture, or a map, is worth a thousand words. GIS provides you with

an incomparable visual tool, in addition to its spatial analytic ability. USGS topographic maps (at various scales) are used as background to help you become oriented. Digital air photos will become available on GeoTracker to enhance site location and analysis. Want to add the dimension of time? An additional feature of GeoTracker is its ability to generate water quality graphs on-line that plot contaminant values across time, so users can visualize trends.

All of the Internet mapping sites we visited promise expansion of services in the future, and the mapping industry is busily developing new applications to expand GIS capabilities.

*The Internet can streamline the permit renewal and compliance process by making it easy to enter, transmit, and retrieve data.*

#### Test Drive a Site Today

Now that you are aware of the benefits, find out how easy it is to use interactive mapping. Take, for example, GeoTracker. (See a demo of all site features at <http://www.geotracker.ecointeractive.com/gdemo/>.) There are various ways to locate a site. You can use a business name, an exact or partial address, or a case ID. All sites in an area can be found by entering a particular street, city, or county. When information is really sketchy, use a wildcard (\*) to let the computer do the work. Enter North\*, if you don't know whether North is a street or an avenue. The computer will display all possibilities.

Once on the map screen, you can select various data layers or "themes," and use "tools" to zoom in or out, or identify a feature, such as a leaking underground fuel tank (LUFT) site or a well, selected on the map. You can also select a well and search for LUFT sites within 1,000 feet or 2,640 feet (one-half mile), or vice versa. This area is called a "buffer" and is used for proximity analyses.

To get more information about a particular well at a desired location, first use the identify function and then click on the well name. You will discover links to other screens that

contain several layers of information—well description, public water system information, number of LUFT sites estimated to be within one-half mile. You can delve deeper for locational information, including latitude/longitude, the way in which the data were obtained, estimated level of error, nearest physical address, elevation of a well, or public water supply information, including system name, class of system, number of connections, and population served.

For specific LUFT sites, you can access regulatory history, locational information, more detailed site and leak information, and number of public wells estimated to be within a specified distance of the site.

#### Events That Have Enhanced This Information Revolution

Aside from the obvious advances in technology and software, a few key events have contributed to the availability, accuracy, and usability of GIS in the environmental field:

- The development of interactive mapping, an extension of commonly used GIS software to display GIS products over the Internet. Quality GIS software is expensive, and this system provides low-cost access to valuable geographic information. The only requirement is Internet access and a compatible browser. The user can view and query GIS data using a map interface.
- Recognizing that GPS has become "a global utility" for navigation, communication, and emergency response, the U.S. government abandoned the intentional degradation of signals (for security purposes) in May 2000. GPS users can now pinpoint locations with much greater accuracy. This ability narrows an area down from the size of a football field to that of a tennis court.
- The Internet is growing in leaps and bounds. According to the Internet Society, use of the Internet has been doubling annually since 1988. With an estimated 150 million users in 1999 worldwide, Internet usage is expected to reach 300 million by the end of the year 2000.



## Getting Started

There are several ways to gather support to develop GIS and interactive mapping. In Idaho, initial work was under way when a new manager came on board and wanted the application to be up and running in a month. The focus on this effort speeded the delivery of new equipment, which made it happen soon after.

In California, the application was developed by popular demand. Stakeholders were brought together and given a sense of ownership in the development and advancement of an Internet mapping application. They found that while it may help to have a visionary at the top, not to mention the interest of the governor and a legislative mandate, the process worked from the bottom up, rather than from the top down. Members of various regulatory agencies, water districts, and the petroleum industry came together and were able to visualize the benefits to their respective organizations. Ideally, user groups should remain involved and as broad as possible. Conference calls are still held twice each month to address GeoTracker issues.

It helps to form partnerships with other state and federal agencies to identify the benefits of sharing information. Establish common "themes" and data elements. Everyone should be reading from the same script and speaking the same language.

## How Far Out in Left Field Are You?

If you plan to get started on GIS, there is no time like the present to begin the process of improving location data. The first step is often to "clean" your data. For example, before you verify the location of wells, give each well a unique identification name or number. Older water systems may have a confusing array of names, or a single name applied to multiple wells. In California, a delay in issuance of state well names left many wells officially "unnamed."

The biggest barrier to performing spatial analysis is obtaining accurate locations. Starting with what you already have, plot your data and find out where each location is. If the site

appears to be out in the ocean or in a different state, you know it's wrong. You can also run a sample analysis. LLNL evaluated the location of drinking water wells in California. To do this, the lab acquired highly accurate locations for over 1,000 wells and compared them with locations in the state database—26 percent of the sites were within 1,000 feet of the actual location and 40 percent were within a half a mile.

Improving locations for LUST and UST facilities can be relatively easy. Permitted facilities have addresses, but water wells generally do not. Thus different approaches are needed. Geocoding software is available that can match up street addresses with latitudes and longitudes.

*It helps to form partnerships with other state and federal agencies to identify the benefits of sharing information. Everyone should be reading from the same script and speaking the same language.*

In California, LLNL found that 84 percent of commercial facility addresses produced reasonably accurate latitudes and longitudes with an estimated median error of 396 feet. According to Dr. Anne Happel of LLNL, the batch approach and address matching are most cost- and time-efficient for regulated facilities. First, the addresses are standardized and verified using U.S. Postal Service software, then they are matched up to locations using commercially available geocoding services. "If it is a facility owned by a corporate entity, make sure you have the address of the facility with the tanks, and not the corporate office," cautions Happel.

When LLNL compared verified well location data for over 1,200 wells with locations in the state database, the median error was estimated to be 2,251 feet. Obviously, when a buffer or radius of 1,000 feet is used to assess vulnerability, a high level of accuracy is needed for well locations. Accurate well locations are more difficult to obtain, but with GPS technology improving, and becoming less

expensive and more available, help is on the way. When data are directly downloaded from a GPS unit into the system, it allows for "single entry, multiple use." It saves time and reduces errors. Old-fashioned mapping onto assessor parcel maps and digitizing is also a possibility. California's DHS is committed to getting location information to within a 25-meter accuracy by 2003.

## Security Issues

Of course, with thousands of wells and facilities and their related data, you can never guarantee 100 percent accuracy and availability. All Internet mapping sites include disclaimers concerning the accuracy of data. A disclaimer describes the purpose of the application—for example, to provide a visual display of statewide or local data from various sources. The disclaimer directs the user to the state agency staff to be sure of obtaining complete, accurate, and up-to-date information.

The disclaimer also points out particular requirements such as screen resolution that are necessary to properly view the features and indicates that the sites are dynamic and subject to change as more maps are created. Some maps or databases may be temporarily unavailable because of updating. For the applications that allow the user to input data, such as GeoTracker, passwords are issued to authorized users.

## Interim Steps—Your Warm-Up Act

A number of states have plans in the works to develop or improve their GIS and Internet access. Virginia plans Internet access to its geodata, and at present has put in place an interim step. It is a "very friendly" GIS station located at each of the six regional offices and headquarters that is available to the public. The geodata contains all 15,000 petroleum release sites plus historical data.

Users can select counties, "pan" around for a specific site, zoom in or out, or identify sites within a given radius. They can also look for a specific petroleum complaint or a site name and address, and determine whether the complaint is "opened or closed." For more detailed information,

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## ■ The Future Is Coming...

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such as the extent of contamination or health risks, they are encouraged to check the site characterization reports, which are available to the public at specified regional offices. To protect the privacy of responsible parties, financial information related to the ability to pay for cleanup is kept separately.

**New Hampshire** uses a similar approach. The Site Remediation Programs for the Waste Management Division sponsor a GIS terminal at their headquarters office for the public, consultants, and other parties to identify potential and existing contamination sources and water sources. They charge small fees to print maps and reports. Reports can be saved to a disk, and a feature to save maps will be incorporated later. In the meantime, source and receptor databases with addresses are available over the Internet on a system called "Onestop" (<http://www.des.state.nh.us/onestop/>). That's the warm-up act until a New Hampshire Internet GIS site is on a Web site near you—soon.

### **It Just Makes Sense**

The reason for getting your GIS program up and running on the Internet is not because everyone else doing it, but because spatial analysis can improve your agency's ability to protect the environment through better information and sharing of that information. The public can get better (graphical) answers to questions than they can over the phone, and you can spend your time doing site inspections and catching the leak before it reaches the well.

In the next issue of *LUSTLine*, we'll continue our technology theme with a story about a new integrated UST inspection system, developed by EPA Region 2 and New York, that uses GPS to enter information into the database in the field...and much more. Stay tuned. ■

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*Ann Carpenter is a former EPA employee who now teaches geography at a community college in Massachusetts and writes on a free-lance basis.*

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